Michigan Tribal Transportation Meeting Brings Tribal, State, & Federal Planners Together at KBIC

John Velat
Michigan Tech TTAP Writer/Editor

The Keweenaw Bay Indian Community hosted the 2003 Michigan Tribal Transportation Meeting in Baraga, Michigan May 6-8. Tribal, State, and Federal representatives presented information on interagency cooperation and funding opportunities. The Midwest BIA Region Office organized the meeting.

Attendees found out about state programs that offer tribes and Michigan communities funds for transportation improvements and encouraged tribes to participate. The funds are available for aesthetic, non-motorized, historic preservation, and highway runoff projects. According to Michigan DOT representatives, between 1992 and 2003, Michigan DOT has distributed $196 million under this program, yet tribes, although eligible, have not applied for the program. For more information on the program, tribes can visit Michigan DOT’s website or contact TTAP.

Nationwide 511 Service Rollout

Compiled from 511 Coalition Information Sources

The 511 traffic information service telephone number was established in July 2000 by the FCC. Dialing the number in participating areas can give you access to local weather, traffic, construction, and public transportation information.

The 511 Deployment Coalition helps organize the 511 traffic information system rollout in the United States. Coalition members include the American Association of State Highway and Transportation Officials (AASHTO), American Public Transportation Association (APTA), Intelligent Transportation Society of America (ITS America), and the US Department of Transportation (USDOT). For more information on 511, visit <www.deploy511.org> or contact TTAP.

511 Deployment Status

Compiled from the 511 Coalition Information Sources. The map shows 511 deployment status as of April 24, 2003. Each state is color-coded based on the following criteria:

- Red: 511 Operational (“Live”)
- Orange: 511 Assistance Funding
- Yellow: Live & Assistance Funding
- Green: Operational in 2003
- White: No Activity

Accessible by 13% of Population

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Michigan Tech
Transportation Institute
Michigan Technological University
### TTAP Regional Tribes

- Aroostock Band of Micmac Indians
- Bad River Band of Lake Superior Chippewa Indians
- Bay Mills Indian Community
- Bois Forte (Nett Lake) Band of Chippewa
- Catwba Indian Tribe
- Cayuga Nation of Indians
- Chitimacha Tribe of Louisiana
- Coushatta Tribe of Louisiana
- Eastern Band of Cherokee Indians
- Fond du Lac Band of Chippewa
- Forest County Potawatomi Community
- Grand Portage Band of Chippewa
- Grand Traverse Band of Ottawa & Chipewa
- Hannanville Indian Community
- Ho-Chunk Nation
- Houlton Band of Maliseet Indians
- Huron Potawatomi, Inc.
- Jena Band of Choctaw Indians
- Keweenaw Bay Indian Community
- Lac Courte Oreilles Band of Lake Superior Chippewa Indians
- Lac du Flambeau Band of Lake Superior Chippewa Indians
- Lac Vieux Desert Band of Lake Superior Chippewa Indians
- Leech Lake Band of Chippewa Indians
- Little River Band of Ottawa Indians
- Little Traverse Bay Band of Odawa Indians
- Lower Sioux Indian Community
- Mashantucket Pequot Indian Tribe
- Menominee Indian Tribe of Wisconsin
- Match-e-be-nash-she-wish Band of Pottawatomi Indians (a.k.a. Gun Lake Band)
- Miccosukee Tribe of Indians
- Mille Lacs Reservation Tribal Council
- Mississippi Band of Choctaw Indians
- Mohegan Tribe of Indians
- Narragansett Indian Tribe
- Oneida Nation of New York
- Oneida Tribe of Indians
- Onondaga Nation of Indians of Wisconsin
- Passamaquoddy Tribe Indian Township Reservation
- Passamaquoddy Tribe Pleasant Point Reservation
- Penobscot Indian Nation
- Poarch Band of Creek Indians
- Pokagon Band of Potawatomi Indians
- Prairie Island Indian Community
- Red Cliff Band of Lake Superior Chippewa Indians
- Red Lake Band of Chippewa Indians
- Sac and Fox Tribe of Mississippian Iowa
- Saginaw Chippewa Indian Tribe
- Sault Ste. Marie Tribe of Chippewa Indians
- Seminole Tribe of Florida
- Seneca Nation of Indians
- Shakopee Mdewakanton Sioux Community
- Shinnecock Nation
- Sokaogon Chippewa Community
- Stockbridge Munsee Community
- St. Croix Chippewa Indians
- St. Regis Band of Mohawk Indians
- Tonawanda Band of Seneca Indians
- Tunic-Biloxi Indians of Louisiana
- Tuscarora Nation of Indians
- Unkechage Nation
- Upper Sioux Community
- Wanpanoag Tribe of Gay Head Aquinnah
- White Earth Band of Chippewa Indians

### Editor’s Corner

#### Take Advantage!

In this issue you’ll find information on programs that have been created for YOU to gain knowledge, funding, and technology resources. These programs are already funded, already running, and easy to take advantage of. The little effort that they require you to contribute can mean a big payback in funding and operations.

On page one we report on a conference that brought tribal, federal, and state representatives together to help smooth the three-way communication and cooperation required to get things done. Just getting the participants to come together and meet each other was a great benefit, not to mention the information on programs that tribes can participate it. Read Michigan Tribal Transportation Meeting Brings Tribal,

### Pathways

**Spring/Summer 2003**

**Pathways** is published quarterly by the Tribal Technical Assistance Program, in the Michigan Tech Transportation Institute at Michigan Technological University. The Tribal Technical Assistance Program is part of a nationwide effort jointly financed by the Federal Highway Administration (FHWA) and the Bureau of Indian Affairs (BIA). It intends to relay the latest technology and information on tribal roads and bridges, tourism, recreational travel, and related economic development to tribal transportation and planning personnel. TTAP’s regional tribes are those in the Minneapolis and Eastern BIA Regions. Contact the TTAP office for a free Pathways subscription, or to submit articles and suggestions.

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**Lac du Flambeau Band of Lake Superior Chippewa**

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**U.S. Department of Transportation**
Federal Highway Administration
New in the TTAP Library

Dust Control on Low Volume Roads, A Review of Techniques and Chemicals Used
A practical guide for reducing dust on low volume roads. Seven surface maintenance techniques are presented, offering the rural maintenance engineer a selection of methods based on traffic, environmental concerns, available resources, and road material. The Review covers both traditional and non-standard stabilizers.


Rural ITS Toolbox
The Rural Intelligent Transportation System (ITS) Toolbox, published by the FHWA, offers rural planners examples from real-world ITS applications. The Toolbox provides solutions to problems of rural emergency services, tourism and travel information, traffic management, rural transit and mobility, crash prevention and security, operation and maintenance, and surface transportation and weather. The publication is also available electronically from the ITS Electronic Library at www.its.dot.gov/itsweb/welcome.htm.


Basic Asphalt Recycling Manual
This manual provides information on various asphalt recycling methods, benefits, procedures, mix design philosophies, equipment requirements, QA/QC, specifications, and definitions and terminology of asphalt recycling.


Designing Sidewalks and Trails for Access, Best Practices Design Guide (Part 2)
The second part of a two-phase project that gives planners, designers, and engineers a better understanding of how sidewalks and trails should be developed.


Michigan Tribal Transportation Meeting

Todd Kennedy of the Midwest Regional BIA office gave an update on Indian Reservation Road (IRR) program and funding issues. The negotiated 95CFR170 is still under review by the BIA, FHWA, and OMB. The final rule should be published by October 2003. (According to the Federal Register, as of June 5, 2003, a temporary rule released 75 percent of available funds to projects on or near Indian reservations using the relative need formula.)

The BIA also reported that the road inventory process according to BIAM 57 would be automated during FY2003. Michael Berlin, Agency Engineering Technician, presented a review of road inventory collection. (See article on GIS and Basic Inventory with GIS sidebar in this issue.) Additional BIA activities for FY2003 include the national BIA reorganization, training on the new funding formula, work on transportation system planning and management systems, and the CTIP update.

Other Agency presentations summarized engineering, design, and construction activities in the Great Lakes region. BIA Engineer Dave O’Donohue updated attendees on construction status of BIA roads and bridges, while noting that only $4.9 million of the $6.5 million budget had been funded. Michael Berlin, BIA Engineering Technician, presented the FY2003 road maintenance program and deferred maintenance information. Contact Todd Kennedy, BIA Regional Road Engineer, at 612-713-4400 for more information on BIA programs (e-mail is not available for the BIA at this time).

Presentations by the FHWA, Michigan DOT, BIA, and TTAP covered other planning, funding, and legislative issues relevant to tribes in the Great Lakes region. You can receive copies of these and other presentations from the Michigan meeting by contacting Michigan Tech TTAP.

By press time, similar meetings had taken place in Wisconsin and Minnesota. Watch for next year’s meeting times and places in future Pathways.
GIS stands for Geographic Information System. If you are involved with any planning or development of anything that can be located on a map, you will eventually hear about GIS applications. GIS offers a means to attach data to a physical location. The physical location can be on, above, or below ground. For transportation and municipal workers, that means you can identify and locate information about a bridge, road, water line, sign, culvert, power line, building, property boundary, pollution plumes, population densities, and much, much more, all on a digital map. Once the information has a location attached to it, you can analyze and manage that information relevant to its location.

A simple GIS application might be a database of culverts that includes culvert location, type, condition, and installation date. With this information in a GIS, you could look at a map and see where all the culverts are located, and easily identify which ones might need maintenance based on their age or condition.

More complex GIS applications help identify problems based on their time and location. A roads engineer might look at all of the accidents occurring on tribal roads and identify dangerous curves or intersections. If there appeared to be more accidents than average on a specific curve, the engineer might look at when the accidents occurred. The planner could then determine, for example, that more accidents occurred on snowy days, and that could lead to a simple solution to a dangerous situation: Better winter road maintenance on that curve.

GIS Components

Geographic Information Systems are made up of data, maps, software, computers, and equipment for identifying a location in three-dimensional space. A common tool that is commonly confused with GIS is the Global Positioning Satellite receiver (GPS). Other components of a GIS include a computer, GIS software and database, and digital maps. A computer is key to managing the potential mountain of data that a GIS can contain, and it also acts as the interface with the digital maps and data. Today’s software usually presents the GIS data graphically, showing relevant information associated with map features. Digital maps are obviously at the heart of a GIS, giving all the other data a geographic reference.

Location

A GPS is used to identify the physical location of a data point in a GIS. By receiving a signal from a constellation of satellites surrounding the Earth, the GPS receiver can tell you where it is located in x, y, and z coordinates. GPS receivers show the x and y plane locations as latitude and longitude, and the z plane is identified in altitude above or below sea level. The most accurate GPS receivers are surveyor grade and rely on a combination of electronic location aids and software routines to reduce the margin of location error to less than 0.2 inches (5 mm). Even inexpensive ($150-400) GPS receivers can identify your location to within 10 feet (3 m), while more expensive handheld units ($500 and up) achieve accuracy of less than 3 feet (sub-meter). Considering the fact that you are usually holding a GPS receiver in your hand, you could easily impose less accuracy than the GPS receiver is capable of by simply moving your arm while standing in place!

You could also use other techniques to identify a location for most GIS applications. Traffic crashes are usually identified using a measuring tape and simply

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**How Data is Represented by Layer in GIS**

GIS maps are generally shown in two dimensions as a composite of different layers. The map below shows a 2D composite of the sign, utility, road, and satellite imagery seen on the left. You can hide, show, and change the order of layers in your GIS application.

GIS data is organized into layers. Each layer can contain data with similar characteristics. For example, this map shows signs, utility infrastructure, roads, and satellite imagery on separate layers. The vertical separation between features has been increased to better show their logical separation, but you would normally reference the actual elevation of each feature against sea level for true 3D representation.

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**Do You Already Use GIS?**

If you are already using a GIS, let us know about it. We would like to report on real-world tribal and transportation GIS applications for publication in a future issue. Your experiences can help others start working in GIS faster while avoiding the problems you may have already faced. Contact us at TTAP@MTU.EDU or 888-230-0688 and we will collect the information necessary for the article. You won’t have to write anything or talk to a crowd if you don’t want to. Of course if you want your 15 minutes of fame, we’ll be happy to give you the chance.
referred from a known fixed object (crashes are sometimes even “eyeballed” by the reporting officer). Most of the base information and location of objects in a GIS were established before the GPS was invented and the data was collected using traditional surveying techniques. A GPS is a very useful part of a GIS, but it is not absolutely necessary.

Data

The data entered into a GIS are what future decisions are based upon, therefore, if you put garbage in, you’re going to get garbage to come out. The police officer who “eyeballs” a crash location may put a decision-making process into action that creates solutions to dangerous intersections that don’t exist. If, for example, several crashes are located incorrectly near an intersection, a traffic safety analysis might lead to the conclusion that many people are running a stop sign, when, in fact, accidents are actually occurring before the intersection at a driveway with poor visibility. Of course a good safety analysis would include some inspection of the problem intersection—the data from a good GIS system isn’t the only thing that’s necessary to make better roads.

Maps

Geographic Information Systems use maps to connect information to a relevant location. A GIS contains a “base” map that serves as the foundation upon which all other data layers are referenced. When a surveyor looks for a reference stake when plotting a new roadway, she is looking for a “known” reference from which the location of new construction can be plotted. A GIS system uses a base map in the same way, referencing new data points to known references. Even though there is one base map, the system may have many maps to show physical or logical information. Whether the base map is visible or not, all of the maps and data in a GIS are connected to the base map. When viewed together, the base map with data layers forms a composite image that helps the user better understand how data is related to location. See the How Data is Represented by Layer in GIS sidebar on page 4 for more information on data layering.

Software

GIS software simply helps make connections between geographic locations and data. Examples for transportation and planning are obvious: Find dangerous intersections, see what roads are covered with asphalt, locate all stop signs, locate water lines, or plan plow truck routes.

Some links between data and location may be less obvious, like the connection between crimes and location. Discovering a connection between crimes and location can help catch a criminal working a familiar area. A municipal planner could help prevent crime by analyzing and correcting the location of continued on page 6

BIA Adopts Agency-Wide GIS Software Supplier

The Department of the Interior (DOI) has selected ESRI as their standard agency-wide Geographic Information System (GIS) software supplier. The BIA and federally recognized tribes fall under the DOI licensing agreement with ESRI, says ESRI Federal Accounts Manager Dave Fosdeck. This licensing agreement gives tribes access to powerful GIS software packages and training at reduced rates.

The license agreement covers the purchase and use of the following ESRI ArcGIS 8.X products:

- ArcGIS/ArcInfo Concurrent-Use licenses (installed on a network)
- ArcGIS/ArcInfo Dual-Use licenses (for occasional use on a laptop)
- ArcView Concurrent-Use licenses (installed on a network)
- ArcView Single-Use licenses (installed on a desktop)
- Survey Analyst (0)
- ArcPad Application Builder (1)
- ArcPad (14)
- ArcSDE Server (12)
- ArcIMS Server (13)
- ArcStorm (1)
- ArcEditor (1)
- ArcGIS ArcView Concurrent-Use
- ArcGIS 3D Analyst, Spatial Analyst, Geostatistical Analyst, ArcPublisher and StreetMap USA Concurrent-Use
- ArcPress for ArcGIS Single and Concurrent-Use
- ArcView GIS 3.X Single-Use (includes upgrades to ArcView 3.3)
- Network Analyst, Spatial Analyst, 3D Analyst, and Tracking Analyst Single-Use
- ArcGIS 3D Analyst, ArcPress, Geostatistical Analyst, ArcPublisher, and Spatial Analyst Single-Use
- ArcPad

ESRI Limited Products:

These products are referred to as ‘capped’ products in the DOI License Agreement (numbers in parentheses are new BIA licenses; allocations within the Bureau are in progress):

- ArcIMS Server (13)
- ArcSDE Server (12)
- ArcPad (14)
- ArcPad Application Builder (1)
- Survey Analyst (0)

To apply for ESRI software under the agency-wide license, please review the program details and fill out the form at <www.esri.com/industries/federal/bia/>, or call TTAP at 888-230-0688 to receive the forms by fax or mail.

For more information on ESRI products for tribal agencies, contact David Fosdeck of ESRI Denver at 303-449-7779. For information on the ESRI - DOI licensing and training program, contact BIA representative Mark Zundel at 303-231-5100.
Basic Inventory with GIS

The BIAM57 is a manual describing the tribal transportation infrastructure inventory process. Tribes should complete a BIA 5704 form for each road segment in their inventory, and TTAP decided to help tribes complete this form using GIS tools. We travelled to the Keweenaw Bay Indian Community (KBIC) to show Jim Ekdahl, KBIC Roads Manager, how to use GIS tools for 5704 data collection.

To evaluate existing roads, you may be able to use maps issued by the USGS or a state and fill out much of the form without leaving your office. Jim needed to add proposed and recently built roads to his growing tribe’s road inventory, so the existing maps were useful as a reference, but he still needed to get out of the office and onto the new road to complete form 5704.

The data Jim collected will form the basis for new map data used not only by his tribe and the BIA, but also by the state. The state will add Jim’s data to their framework so that inter-governmental programs such as 911 and transportation planning have up-to-date road information.

We put together a “5704 toolbox” that included the BIAM 57, a PASER gravel roads evaluation manual, a PASER paved roads manual, a laptop with ARCPad 6.0, and a PC Card GPS. We loaded state framework maps into ArcPad as reference and made a computerized 5704 form for entering information about the roads we added to KBIC’s inventory.

Inventorying the roads was simple. We drove to the start of a road to be inventoried and stopped the car to get a fix on our GPS and enter the new segment information. We then drove to the end of the new segment (usually an intersection or beginning/end of a curve), and stopped again to mark the end of the segment. The GPS tracked our movement over the length of the new segment, and we simply added relevant inventory information to the computerized 5704. Back at the office, we printed out a copy of the 5704 form with our field-collected data, and printed a map showing the new segment.

The KBIC has some roads which are still proposed and not easily driven with a car. In this case we could simply walk the new road or drive an ORV over the proposed route while tracking our progress on a GPS. You could then enter the necessary data back at the office.

The process of collecting 5704 data is similar for existing roads, but you probably don’t have to stop the car as you drive each segment. Your data collection copilot can see the beginning and end of each segment as you pass over them at a steady but safe speed. Please do NOT drive AND collect data at the same time, or you’ll end up as a new data point on the next GIS crash map!

You can find maps to get you started with your road inventory here:

- www.usgs.gov
- library.usgs.gov
- mapping.usgs.gov
- rockyweb.cr.usgs.gov/public/outreach/terraserver.html
- terraserver.microsoft.com/place.aspx

You can also find instructions on inventory data collection and an electronic form 5704 for ArcPad at <www.ttap.mtu.edu/gislinks.html>.

A GIS Primer, Continued from Page 5

The power of GIS software makes it a great asset, but it is expensive and complex, requiring a well-trained operator. The complexity of GIS software can be compared to high-end CAD software, and many of the skills associated are similar, so your CAD operator is frequently also your GIS operator.

Computer

The most generic component of a GIS system is the computer. Geographic Information System software runs well on any computer manufactured in the past few years, and the same computer can be used for other tasks. Although not a necessity, a large monitor and powerful computer are certainly convenient.

Many GIS operators use laptops so that they can collect and manage data in the field. Using a laptop also has the advantage of being able to connect to a GPS for real-time data collection and viewing. A real-time GIS may show you information about a road as you drive on it, or you may edit information about the road you are driving on without waiting to return to the office.

Applications

The previous examples in this article show how Tribal planners, engineers, and administration can apply GIS to catalog and manage geographically-relevant data. Another example of a GIS application helps tribes complete the Bureau of Indian Affairs Manual 57 (BIAM57) road inventory requirements.

BIAM 57 instructs tribes on how and what to collect for tribal road inventory reporting. The data is entered on the BIA-5704 form, which includes fields for road identification, traffic data, type, terrain, condition, costs of improvement, ownership, and inventory status. Form 5704 also requires a sketch or map of the inventoried item. (BIAM57 is available for download at <www.ttap.mtu.edu/resources>.) See the sidebar Basic Inventory with GIS to find out how tribes are using GIS for BIAM57 reporting.
**Meet the Michigan Tech TTAP Team**

You may have already heard our names and talked to us on the phone, and now we have a picture for you to associate with those names. From left to right on the bottom are Patricia Hendrickson, Secretary; and Dr. Bernard Alkire, Program Director (and new Grandpa); and in the back row are John Velat, Writer/Editor; Robert Gagnon PE, Program Manager; and Troy Sherman, Webmaster/Student Assistant. Michigan Tech TTAP’s veteran workshop instructor, John Lovato, is not pictured.

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**Equipment and System Examples**

The Department of the Interior (DOI) has adopted ESRI software as their GIS standard, and ESRI is by far the largest and most well-known GIS software vendor. ESRI publishes the Arc series of software (ArcInfo, ArcEdit, ArcPad, ArcView and others). A full license of ArcInfo costs several thousand dollars, but a Tribe may receive large discounts under the DOI discounted licensing agreement (see *BIA Adopts Agency-Wide GIS Software Supplier* on page 5). Full-featured alternatives to ESRI products include Mapinfo, Achean, and others.

Other solutions can be much less expensive than ESRI software. Most states have some type of road management system that are free or discounted for their own agencies, and tribes may be eligible. For example, Michigan has a custom GIS package for inventory and road management called RoadSoft GIS, which is distributed free-of-charge to Michigan counties, and Wisconsin distributes Paserware for their road inventory management.

An alternative to full-feature commercial or custom GIS packages includes a powerful freeware (no license or service fee) program called Geographic Resource Analysis Support System (GRASS). This free, non-commercial software is designed to work on UNIX operating systems (there is a Windows version with some additional limitations), and can be used for very complex GIS applications.

Less complex and inexpensive commercial alternatives include Microsoft MapPoint ($249) or MapTech Terrain Navigator Pro ($299) are also available. These basic systems might not be labeled “GIS”, but they do offer geographic and data mapping adequate for some offices. Either of these products are certainly adequate for recording the features and location of existing tribal roads. MapTech Terrain Navigator includes high-resolution electronic topographic maps and downloadable satellite imagery to see features that might not yet be in a state’s road database.

The other specialized item that is useful for your GIS is a GPS receiver. With a GPS receiver, you can gather location data, by recording latitude, longitude, and elevation from the screen of the GPS receiver, or connect the GPS receiver to a computer running GIS software. Any GPS receiver will work for manual location entry, and most can be connected to a computer with some kind of data cable. Like all electronic devices, GPS receiver prices are falling, and their features are increasing. Simple GPS receivers with PC connectivity were available for $99.99 at on-line retailers as of publication. Add to that a power/PC connection cable for $38 and you can already be collecting data on a laptop, or uploading it to an office-based GIS. The most advanced handheld GPS receivers may also have mapping and/or GIS functions built-in, and may cost several thousand dollars. These advanced GPS units may have centimeter accuracy.

GPS receivers also come in the form of a removable expansion card for laptops, PDAs, and palmtops. The advantage of an expansion card GPS receiver is that you can connect directly to your mobile GIS computer without extra cables. A disadvantage of expansion card GPS receivers is that you cannot use them without the PDA, palmtop, or laptop. Portable computers are generally more fragile than a handheld GPS receiver, so you also might not be able to use your GPS in places or environments where a handheld GPS would not have a problem.

The above-mentioned electronic equipment is available at major electronics retailers and on the Internet. The software mentioned is available at most online software vendors, or directly from software publishers. If you aren’t sure what you need or where to get it, just contact TTAP and we will be happy to help you make your selection (TTAP does not sell equipment or software). We can also help you setup your first inventory collection project with GIS and give you basic training in GIS.
6th Annual National Tribal Road Conference

This conference has been moved from previous years’ October date!

Albuquerque, New Mexico

February 29 - March 3, 2004

Early registration information will be available in October, and reduced rates will be available for registration through January 14, 2004. Contact the Hyatt Albuquerque at 800-233-1234 for room reservations and ask for National Tribal Road Conference rates.

For more information on the conference and accommodations, contact the Colorado TTAP by phone at 800-262-7623 or by fax at 970-491-3502.